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December 30, 2011

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Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, DC 20554

Re: WT Docket No. 10-153, *Amendment of Part 101 to Facilitate Wireless Backhaul*

Dear Ms. Dortch:

On behalf of the Fixed Wireless Communications Coalition (FWCC),[1] pursuant to Section 1.1206(b)(1) of the Commission's Rules, I am electronically filing this written *ex parte* communication in the above-referenced docket.

[1] The FWCC is a coalition of companies, associations, and individuals interested in the Fixed Service—i.e., in terrestrial fixed microwave communications. Our membership includes manufacturers of microwave equipment, fixed microwave engineering firms, licensees of terrestrial fixed microwave systems and their associations, and communications service providers and their associations. The membership also includes railroads, public utilities, petroleum and pipeline entities, public safety agencies, cable TV providers, backhaul providers, and/or their respective associations, communications carriers, and telecom attorneys and engineers. Our members build, install, and use both licensed and unlicensed point-to-point, point-to-multipoint, and other fixed wireless systems, in frequency bands from 900 MHz to 95 GHz. For more information, see www.fwcc.us.

The FWCC opposes the suggestion of Wireless Strategies, Inc. (WSI) to relax the Commission's antenna standards in the Fixed Service.[2]

WSI asks the Commission to abolish the Category B antenna standard and, for most purposes, the Category A standard as well. WSI would allow any antenna to be deployed, regardless of pattern, subject only to the requirement that, if interference is caused to another licensee or applicant, the licensee must resolve the interference by cutting back power and/or upgrading to a more directional antenna. The improved antenna need not meet Category A standards, unless necessary to address the interference. In no circumstances could the improved antenna be required to exceed Category A.

The present rules, by contrast, require Fixed Service antennas to meet at least the Category B standard in all cases, and to upgrade to Category A if use of a Category B antenna causes interference to another licensee or applicant.[3] These rules reflect good engineering practice.

At first glance the WSI proposal has some appeal. Why require better (and more expensive) antennas than are strictly necessary? But a closer look at the proposal shows it will severely impair spectrum efficiency for all users.

Other things being equal, the directionality of an antenna depends closely on its size. Figure 1 shows the pattern of a highly directional transmitting antenna, in which a large fraction of the emitted energy forms a narrow beam directed toward the receive antenna.[4] The beam nevertheless has significant width, with some additional energy being lost to the sides and back. These properties result from the wave property of diffraction. Minimizing the effects of diffraction, so as to achieve high directionality, requires a relatively big antenna, one whose diameter is many times the wavelength of the signal. In the 6 GHz band, for example, where the wavelength is about 5 cm (2 inches), an antenna meeting the Commission's Category A directionality standard is typically at least 180 cm (6 feet) in diameter.

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[2] *See* Ex Parte Filing of Wireless Strategies Inc. to the Further Notice of Proposed Rule Making (filed Nov. 9, 2011); Reply Comments of Wireless Strategies Inc. to the Further Notice of Proposed Rule Making (filed Oct. 25, 2011); Reply Comments of Wireless Strategies Inc. Regarding the Notice of Inquiry Review of Part 101 Antenna Standards, WT Docket 10-153 (filed Oct. 4, 2011).

[3] 47 C.F.R. § 101.115(c). The FWCC is on record as supporting the addition of relaxed Category B standards to the Commission's Rules. *See* Comments of the Fixed Wireless Communications Coalition at 3-5 (filed Oct. 4, 2011).

[4] The antenna pattern shows the relative strength of the transmitted signal in each direction. All figures show simplified patterns for clarity. Radiation behind the antenna is omitted.

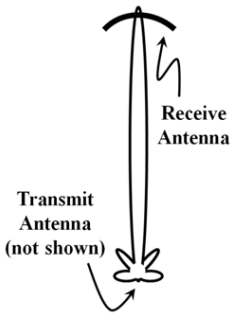

Figure 1
High-performance transmit antenna

Figure 2
Smaller antenna, same power

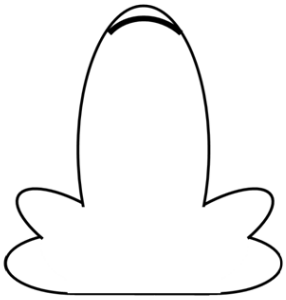

Figure 3
Smaller antenna, higher power

A smaller antenna spreads the signal in a broader pattern, with more leakage to the sides and back. Figure 2 shows a hypothetical smaller antenna, driven by a transmitter having the same power as in Figure 1.

Because a small antenna wastes much of the radiated energy off to the sides, the fraction of the signal that reaches the receive antenna may be inadequate to maintain communications. Making matters worse, a smaller antenna used at the receiving station collects less energy than a larger antenna. Thus, the small-antenna user may have to crank up the transmitter power, beyond that in Figure 1, to deliver a sufficiently strong signal. This case is shown in Figure 3. Note, however, that the higher power increases the emissions not only toward the receiver, but also to the sides (and back) as well. Where multiple links of the kind shown in Figure 1 on the same frequency can co-exist in close geographic proximity, the smaller antenna in Figure 3 "sterilizes" a much greater area against use by others.

The WSI proposal puts no limit on how small an antenna can be, and hence no limit on how broad a pattern it produces. In the absence of those limits, an applicant benefits economically by deploying the smallest possible antenna, despite its propensity to interfere over a wide area. Not only does a smaller antenna cost less at the outset, but it incurs lower costs in tower lease charges. Indeed, WSI cites reduced tower costs as an advantage of its proposal.[5] But there is a strong downside: every new antenna will make a large geographic area unavailable to others, on that frequency.

Not a problem! says WSI. Its proposed rules would require a small antenna user to upgrade, if needed, to accommodate another entrant.

But consider the realities. At the very least, the small-antenna incumbent will incur substantial expense, not only in acquiring and installing a larger antenna, but also in paying higher ongoing costs for tower space.

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[5] Reply Comments of Wireless Strategies Inc. at 1 (filed Oct. 4, 2011).

The situation may be worse, however. In some cases, the tower holding the small antenna will not be able to accommodate an antenna large enough to protect the newcomer from interference. The incumbent would then have to engineer and construct an entirely new link using a different tower. Worse still, depending on the geography and tower availability, it may take two or more links to replace the single link that relied on the small antenna.

No incumbent will be eager to undertake these costs and disruptions. The incumbent is much more likely to dispute the frequency coordinator's interference calculations, argue that other frequencies are available, or otherwise challenge and stall. The newcomer in turn, rather than shoulder the costs and delays of dealing with the incumbent, will likely switch to another, less suitable band, or give up on fixed microwave altogether. We speak from experience: although the present rules require an incumbent to upgrade from Category B antennas to Category A, where necessary to accommodate an applicant, the Category B users have been chronically slow to comply.[6]

The WSI proposal would create yet another pernicious incentive. Even if an incumbent does upgrade, it can minimize both its antenna purchase and tower lease costs (and improve its chances of staying on the same tower) by choosing an antenna just barely adequate to protect the newcomer. The consequence, of course, is that another applicant seeking to operate in the same area may trigger the same process all over again, this time with potentially more than one recalcitrant incumbent.

Fixed Service users have always shared their bands on a co-equal basis. A first-in user has rights against later applicants, but only if it uses a Category A antenna. The WSI proposal would upset that co-equal balance by letting the user of an inferior, interfering antenna effectively block later entrants.

Finally, the deployment of many small antennas over a geographic area would raise the noise floor, and require additional margin in the interference calculation algorithms due to massive multiple exposure. This form of spectrum pollution would impede frequency coordination and further limit the number of licensees who can operate in the area.

The current rules requiring Category B antennas at a minimum, and Category A when needed to accommodate other users, give frequency coordinators a basis for planning. Today a coordinator studying a new application can pick a frequency that both minimizes disruption to existing users and also leaves the maximum possible room for later entrants. These calculations rely, in part, on knowing in advance the minimum antenna characteristics of both the present applicant and the later entrants. WSI's proposal would

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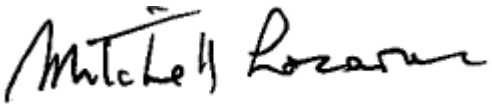
[6] Earlier in this proceeding, the FWCC suggested a rule to change to require that needed upgrades from Category B to Category A antennas take place within a set time. Comments of the Fixed Wireless Communications Coalition at 4 (filed Oct. 4, 2011)

eliminate these certainties, and greatly hamper coordinators in looking ahead to maximize use of the spectrum, both now and in the future.

In short, for all of the reasons given above, WSI's proposal would result in far less efficient use of the spectrum. The Commission should reject it.

Respectfully submitted,



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